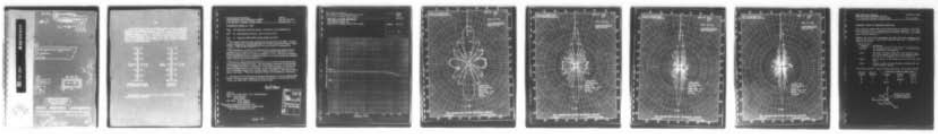
AD-A066 889 NAVAL RESEARCH LAB ORLANDO FLA UNDERWATER SOUND REFE--ETC F/G 9/1
DESIGN, CONSTRUCTION, AND CALIBRATION OF F53 TRANSDUCER SERIAL --ETC(U)
JUL 71

UNCLASSIFIED USRD-CALIBRATION-3268 NL

1 OF 1
AD A
066889



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USRD Calibration [redacted] 3268

LEVEL II

MO3T Project [redacted] 40

(6)

Design, Construction, and Calibration of

F53 Transducer

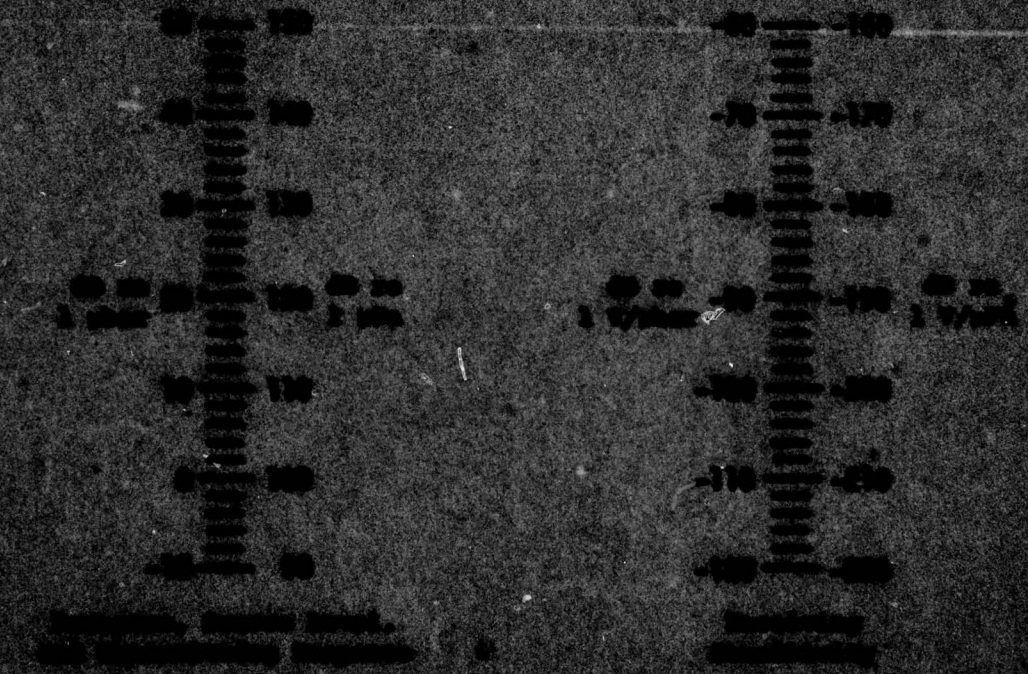
Serial X2[redacted]

(11)

29 July 1971

(12) 9p.

[redacted]



Naval Research Laboratory
UNDERWATER SOUND REFERENCE DIVISION
P.O. Box 8337, Orlando, Florida 32806

HD/hs
K03-30.101/4024
20 July 1971

CALIBRATION REPORT No. 3268

Subj: F53 transducer serial X2; design, construction, and calibration of

Ref: (a) Work Request 419/WR-1-0017 of 20 Nov 1970

Encl: (1) Drawings USRD 66856 through 66860 and 62785

1. The subject transducer was designed and constructed at the USRD, utilizing ceramic piezoelectric cylinders furnished by the Naval Ammunition Depot, Crane, Indiana. Funds for the calibration service were provided by reference (a).

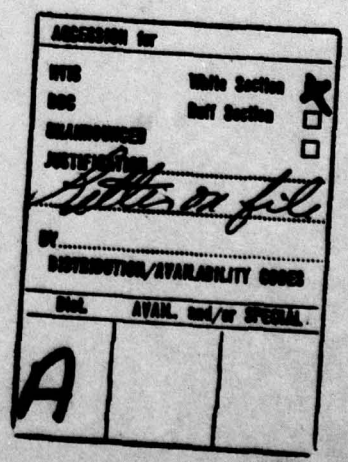
2. The transducer is a line of 20 modified barium titanate end-capped ceramic cylinders 3.81-cm long x 3.81-cm o.d., having the wall thickness 0.32 cm. Spacing between ends of the ceramic cylinders is 1.5 cm. The line of cylinders in the experimental model is enclosed in Tygon B 44-3 tubing (polyvinyl chloride), which is filled with air-free castor oil.

3. Free-field voltage sensitivity and directivity in the XZ (vertical) plane were measured at the Leesburg Facility. The measurement conditions and the results are shown in enclosure (1). Sensitivity in the frequency range 1 to 20 kHz was measured in the Anechoic Tank Facility at the water temperatures 3 and 30°C and at hydrostatic pressure to 6.89 MPa (gage), equivalent to 1000 psig or 689 m depth in sea water. There was negligible change with temperature or pressure.

4. Orientation was according to the method described for a line on drawing USRD 62785. The type number molded in the Tygon tubing was in the direction of the +X axis; the cable was in the direction of the +Z axis.

Harold Dennis
HAROLD DENNIS

Copy to:
NAD Crane (Code 7022C, C.P. Kutrumanes)(1)
USRD (Code 8270)(1)
(Code 8280)(1)
NRL Wash (Code 2620)(1)
(Code 1265)(1)
USRD (Code 8270)(1)(30 Jul 1971)
NAVSHIPSYSCOM (Code 901, Glenn Moore, M.M. Giwer)(3)(18 Feb 1972)



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UNDERWATER SOUND REFERENCE DIVISION
P. O. Box 8337, Orlando, Florida 32806

USRD No. 66856
4024

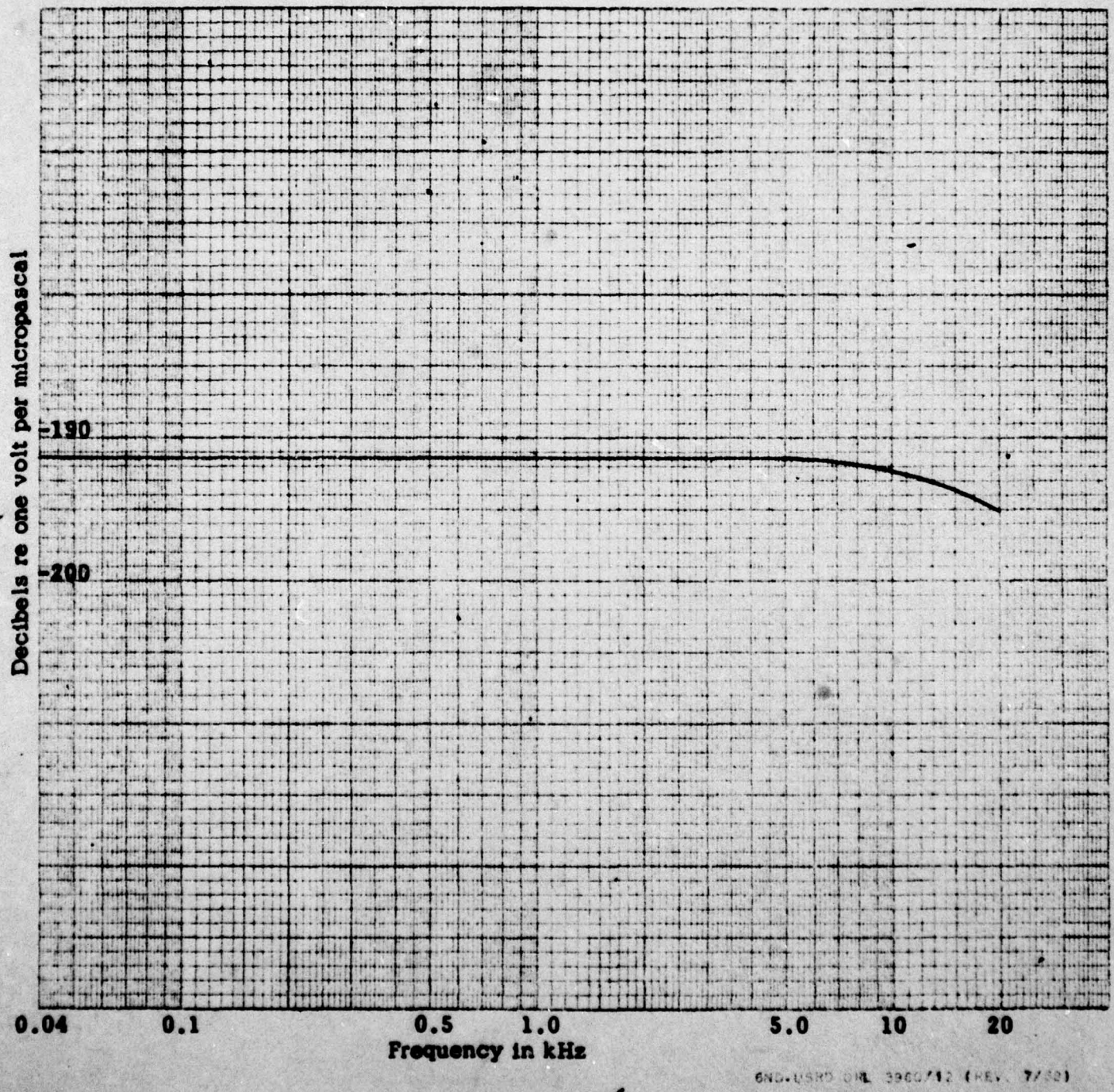
Date Jun 1971

FREE-FIELD VOLTAGE SENSITIVITY
F53 Transducer Serial X2
Open-circuit voltage at end of 36-m cable

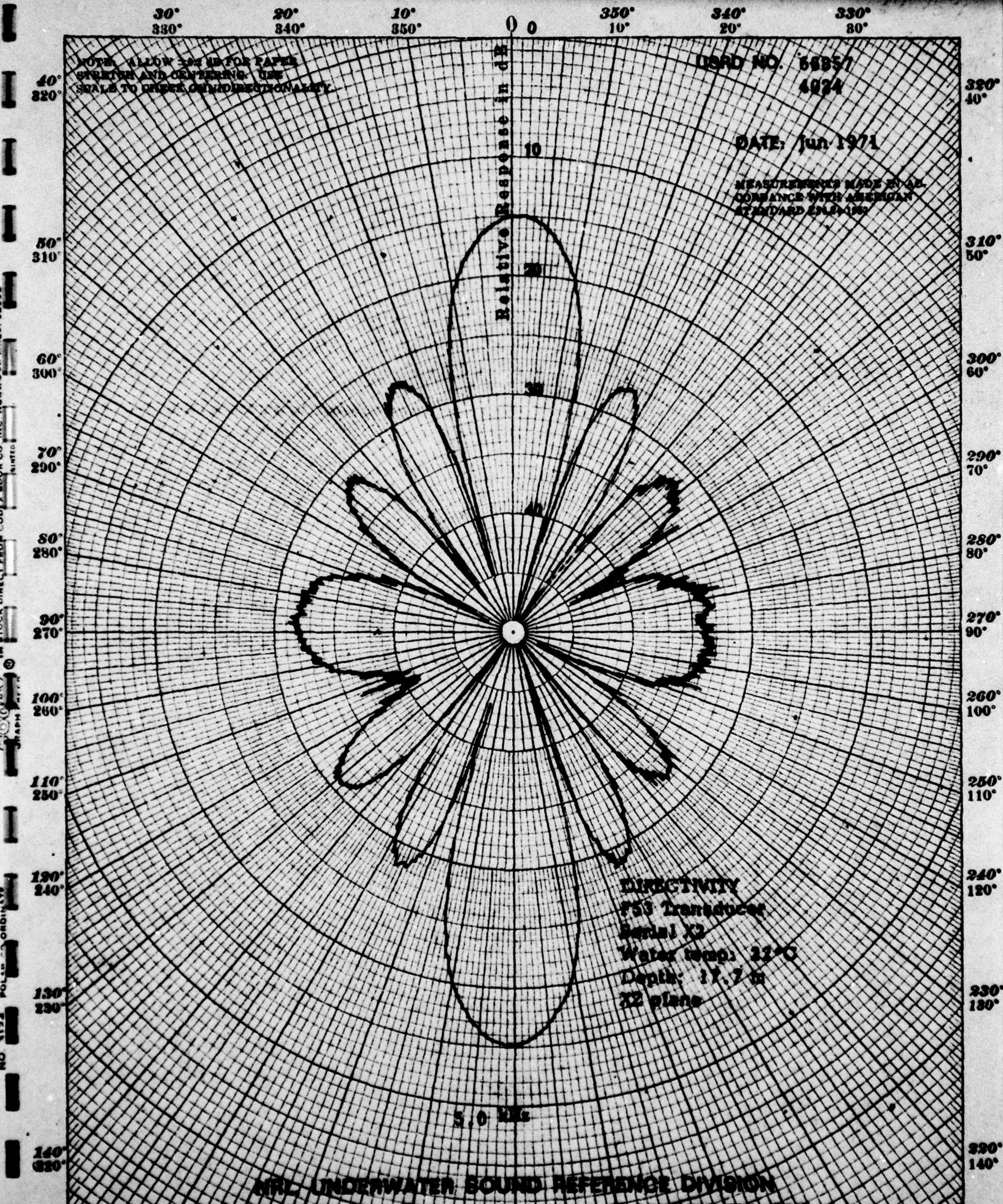
Depth: 14.7 m

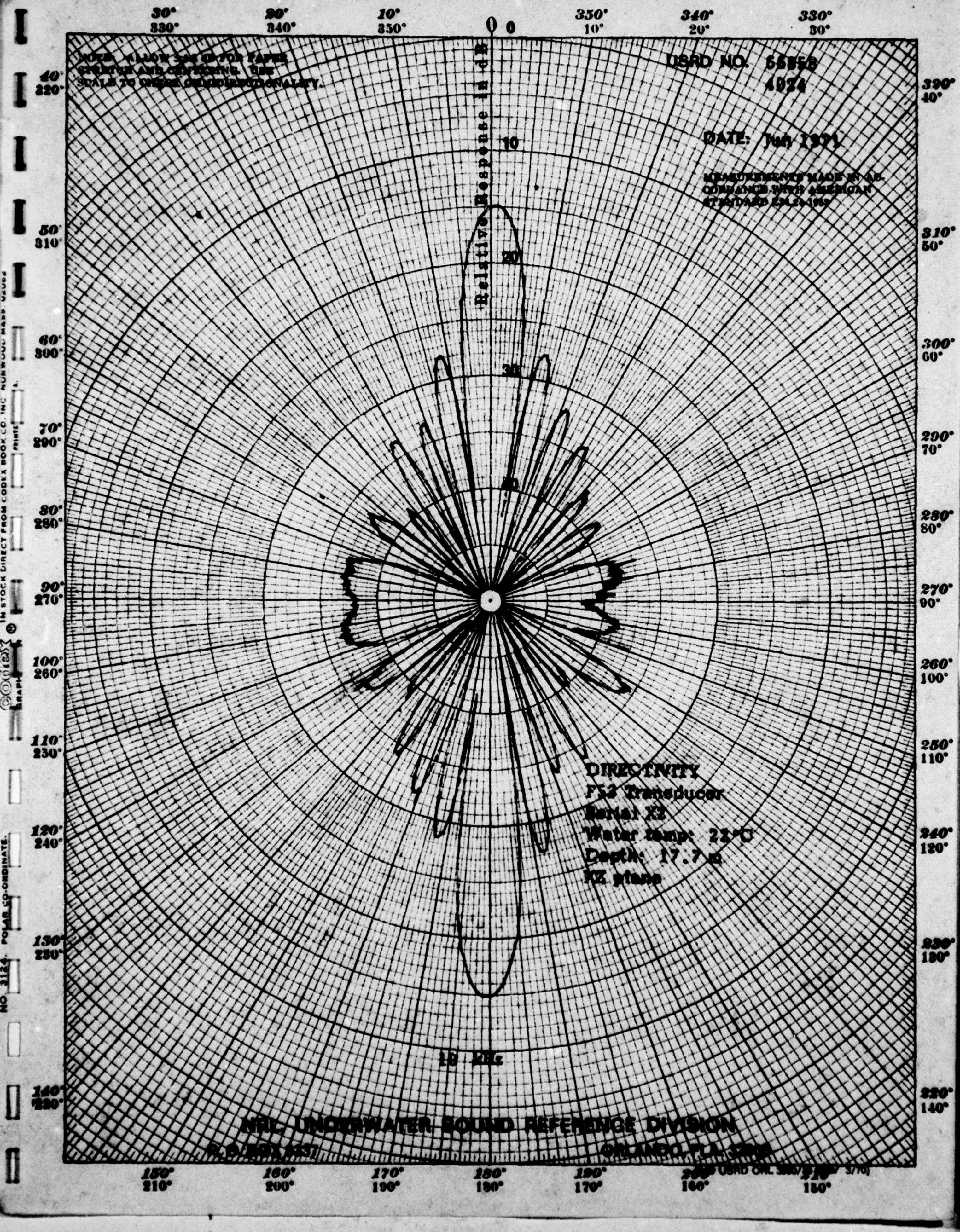
Water temp 22 C

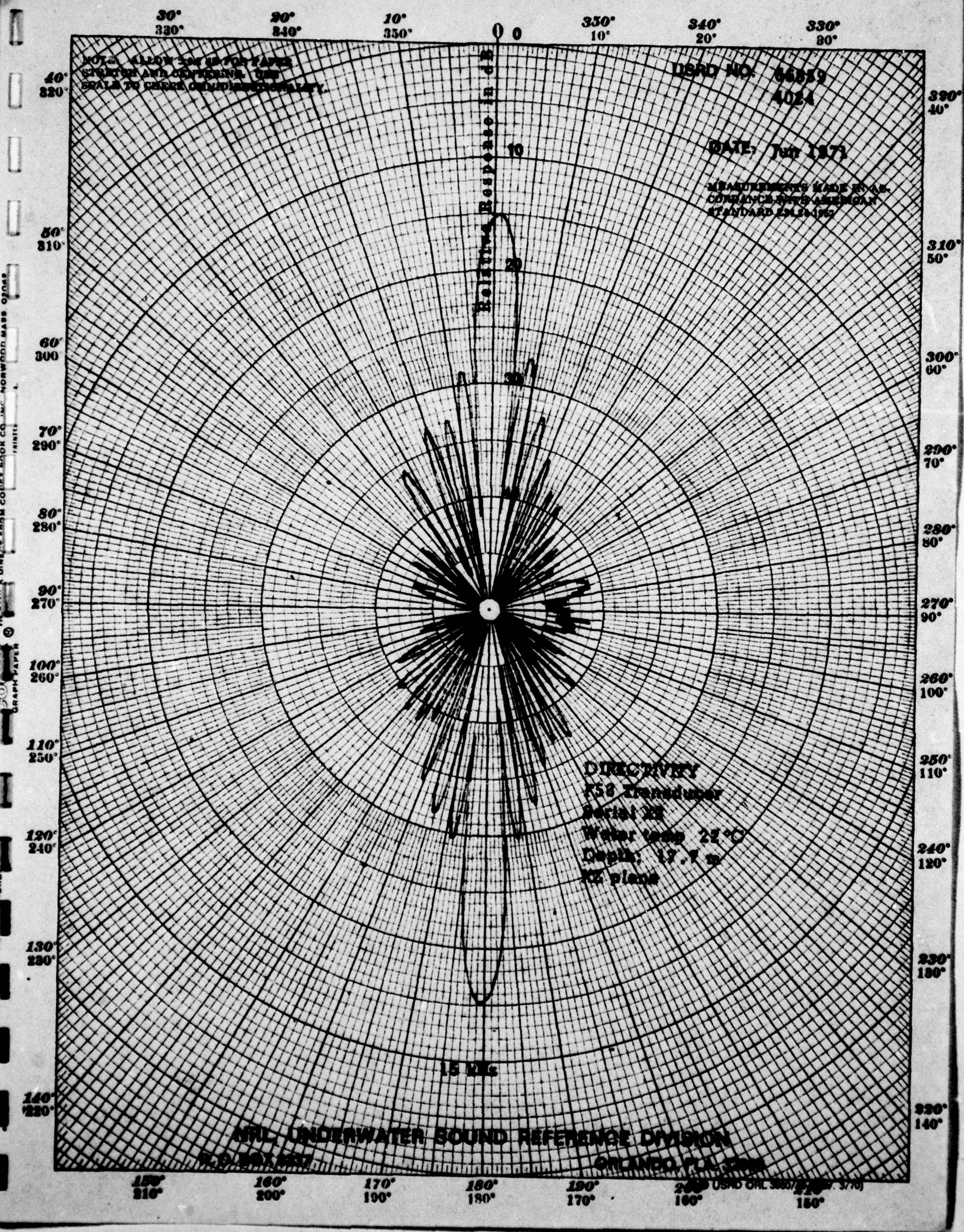
MEASUREMENTS MADE IN ACCORDANCE WITH AMERICAN STANDARD Z 24.24-1957



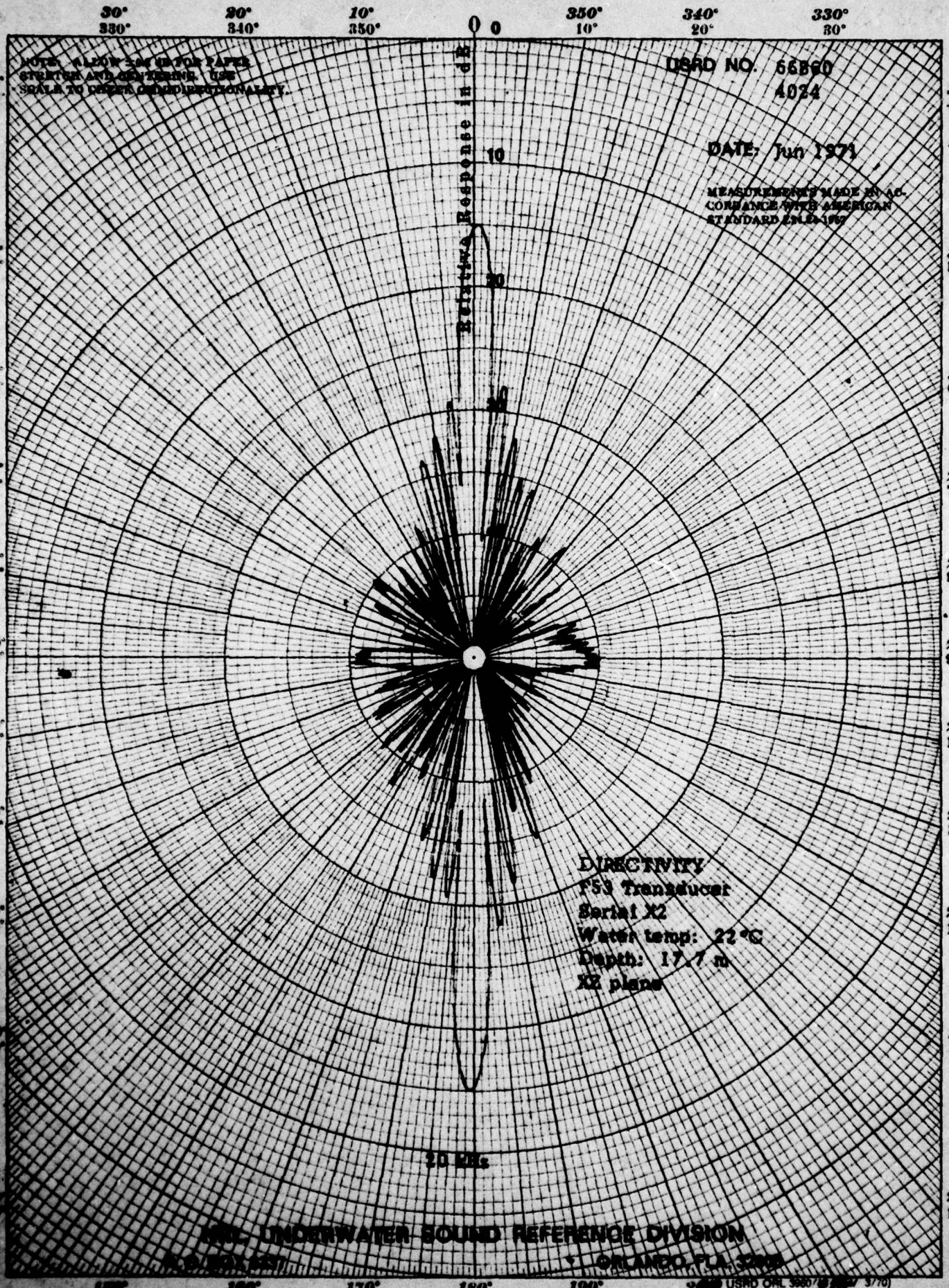
6ND.-USRD ORL 3900/12 (REV. 7/58)


USRD NO. 66857
4024
DATE: Jun 1971
Relative Response in dB
10
20
30
40
DIRECTIVITY
F53 Transducer
Serial X2
Water temp: 22°C
Depth: 17.7 m
XZ plane
5.0 kHz
NRL UNDERWATER SOUND REFERENCE DIVISION
ORLANDO, FLA.
0
30° 330°
20° 340°
10° 350°
350° 10°
340° 20°
330° 30°
40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°
320° 40°
310° 50°
300° 60°
290° 70°
280° 80°
270° 90°
260° 100°
250° 110°
240° 120°
230° 130°
220° 140°
150° 210°
160° 200°
170° 190°
180° 180°
190° 170°
160°
150°


USRD NO.
DATE:
Relative Response in dB
DIRECTIVITY
Transducer
Water temp:
Depth: 17.7 m
XZ plane
kHz
NRL UNDERWATER SOUND REFERENCE DIVISION
ORLANDO, FLA.



DIRECTIVITY
Water temp 22 °C
XZ plane
15 kHz
NRL UNDERWATER SOUND REFERENCE DIVISION
Relative Response in dB
DATE: July 1971
USRD NO.


NOTE: ALLOW 3/8" FOR PAPER STRETCH AND CENTERING. USE SCALE TO DETERMINE OMNIDIRECTIONALITY.
USRD NO. 66560
4024
DATE: Jun 1971
MEASUREMENTS MADE IN ACCORDANCE WITH AMERICAN STANDARD
Relative Response in dB
0
10
20
30
DIRECTIVITY
F53 Transducer
Serial X2
Water temp: 22 °C
Depth: 17.7 m
XZ plane
20 kHz
NRL UNDERWATER SOUND REFERENCE DIVISION
P.O. BOX 8337
ORLANDO, FLA. 32806
30° 330°
20° 340°
10° 350°
0 0
350° 10°
340° 20°
330° 30°
40° 320°
50° 310°
60° 300°
70° 290°
80° 280°
90° 270°
100° 260°
110° 250°
120° 240°
130° 230°
140° 220°
150° 210°
160° 200°
170° 190°
180° 180°
190° 170°
200° 160°
210° 150°

Naval Research Laboratory
UNDERWATER SOUND REFERENCE DIVISION
P. O. Box 8337, Orlando, Florida 32806

USRD No. 62785

1 July 1970

COORDINATE SYSTEM FOR TRANSDUCER ORIENTATION

The coordinate system shown in the sketch below is assigned to the transducer and moves with it, regardless of its physical position. The angle θ is a depression angle measured from the +Z axis; the angle ϕ is azimuth angle in sonar operation.

Response and *sensitivity* measurements are made with sound propagated parallel to the positive X axis unless otherwise specified. Transducers are oriented as follows:

Active Acoustic Surface	Orientation
Cylinder	The cylindrical axis is the Z axis. A reference mark for another axis is specified.
Plane	The plane (or piston) face is in the YZ plane, with the X axis normal to the face at the geometric center. The top of the transducer is in the +Z direction.
Sphere	Specify points on the surface for any two of the three axes.
Other	Provide a sketch of nonconforming configurations and offset acoustic centers.

Directivity Patterns: Unless otherwise specified, the following apply:

Specified Plane	Axis of Rotation	Position of axes on polar plots		
		+X axis	+Y axis	+Z axis
XY	Z	0°	90° cw	upward
XZ	Y	0°	downward	90° cw
YZ	X	upward	0°	90° cw